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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,290	12/30/2003	Kevin M. Carolan	D/A3350	9825
7590	02/18/2005		EXAMINER	
John P. Cornely FAY, SHARPE, FAGAN, MINNICH & McKEE, LLP SEVENTH FLOOR 1100 SUPERIOR AVENUE CLEVELAND, OH 44114-2579			HIRUY, ELIAS	
			ART UNIT	PAPER NUMBER
			2837	

DATE MAILED: 02/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/749,290	CAROLAN, KEVIN M.
	Examiner Elias B. Hiruy	Art Unit 2837

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) Responsive to communication(s) filed on \_\_\_\_.
- 2a) This action is **FINAL**.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_ is/are allowed.
- 6) Claim(s) 1-3,5,6,9-15,18 and 19 is/are rejected.
- 7) Claim(s) 4, 7-8, 16-17 and 20 is/are objected to.
- 8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 12/30/2003 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. ____ .
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____ .	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: ____ .

**DETAILED ACTION**

**Drawings**

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the Electrical Power waveform must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim 6 teaches about electrical power waveform. This claim is neither supported by the drawings nor by the specification. The drawings fail to show what the

applicant is referring to when claiming about the electrical power waveform. In this office action, the prosecution is continued with the presumption that the electrical power waveform is a reference to the current waveform.

**Specification**

2. The disclosure is objected to because of the following informalities: the discussion about the different blocks of figures 1 and 2 does not confirm to the labels assigned in the figures. For instance, label 11, 12, and 14 are illustrated different from the way they are labeled (Page 4, paragraph 15 line 8).

Appropriate correction is required.

**Claim Objections**

3. Claim 20 is objected to because of the following informalities: the reference made by claim 20 is improper. The applicant seems to refer to claim 19, but the written claim refers to itself. In this office, action the prosecution has continued with the assumption that claim 20 is dependent on claim 19. Appropriate correction is required.

**Claim Rejections - 35 USC § 112**

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 6 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The applicant claims that the electrical power waveform of the motor is to be monitored and used to determine the operational state of the motor. The disclosure and

the drawings support only how the current and voltage waveform are utilized to determine the operational state of the motor. The teachings of claim 6 is not clear as to what the applicant is referring to by the electrical power; thus, this office action will proceed with the assumption that what the applicant is referring as the electrical power waveform is the electrical current waveform.

**Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3 and 5 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Ferrari U.S. Patent 4,609,868.

In regards to claims 1-2, Ferrari teaches about a method that is used to detect the state of a stepping motor (i.e. electric motor). Ferrari disclosure teaches how the stepping motor is electrically powered and how the current rises to an operational current level of  $I_0$  (Column 7 lines 23-28). Further, the disclosure has a timing means (Column 8 lines 4-10) that is able to measure the amount of time elapsed before the current achieves the reference current level. By using the value obtained from the detecting means, the motor controller is able to determine the state of the motor (Column 8 lines 10-19). In like manner of claim 2, the reference current level,  $I_0$ , of Ferrari invention is the current at which the motor is determined to operate.

Regarding claim 3, Ferrari invention teaches that the motor has failed (i.e. stalled) when the rise time is less than the predetermined threshold time  $t_2$  such as  $t_1$ . Here is a direct quote:

*"The circuit comprises a timer having a predetermined period between T1 and T0 which activates a bistable circuit indicative of a failure to respond if the current level I is reached in a time shorter than the required time period."*

In regards to claim 5, the invention also has a means (timer) to measure the amount of time that has elapsed.

6. Claims 6 and 9-11 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Taghezout U.S. Patent 4,772,840.

Concerning claim 6, Taghezout discloses about a method that supplies electric power to a stepper motor (i.e. electric motor) and where this electric power has both current and voltage waveforms (See figure 2 and associated description). When the stepper motor is being initially powered by the electric power, the current has a rise time during when the current rises towards a current reference level while the voltage remains substantially steady (See figure 2 and associated description). In the chopping time period, the voltage form is turned On and Off while the current waveform rises and falls (See figure 2 and associated description). In addition, Taghezout teaching shows how the current waveform, Eme of Electrical energy, (i.e. electrical power) is monitored and used to determine the state of the motor (Column 6 lines 1-9).

*"The same principle may be employed in order to determine whether the rotor of the motor has stepped correctly or not in response to a driving pulse."*

*Effectively, if the quantity of energy E<sub>me</sub> converted by the motor attains a predetermined value before a time likewise predetermined has elapsed, this signifies that the rotor has correctly stepped. If this quantity of energy E<sub>me</sub> does not attain such predetermined value in this time, such signifies that the rotor has not stepped."*

Regarding claim 9, Taghezout method teaches about a means that is used to measure the duration of the rise time period t<sub>1</sub> as the current approaches I<sub>ref</sub>.

**Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taghezout U.S. Patent 4,772,840 as applied to claim 6 and 9 above, and further in view of Ferrari U.S. Patent 4,609,868.

Taghezout teaches about a method that meet all the limitation of claim 6 and 9. Taghezout teaching , however, fails to show how a stall can be detected using the rise time information obtained.

As shown earlier, Ferrari teaches about a method that is used to determine if the motor has failed (i.e. stalled) based on the rise time information(Column 7 lines 23-28 and Column 8 lines 4-10). Thus, it would have been obvious for one having ordinary

skill in the art at the time the invention was made to modify Taghezout method by Ferrari teaching in order to have an error free and better motor torque control system.

8. Claims 12-15 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hammermann U.S. 4,625,667 in view of Ferrari U.S. Patent 4,609,868.

Regarding claim 12 and 19, Hammermann invention teaches about an apparatus and a system that has a stepper motor (i.e. electric motor), an amplifier, an amount of time elapsed detection means, and an analyzing means. The amplifier in like manner of this application selectively supplies the stepper motor with electrical power. Further, it has a detection means for determining the amount of time elapsed between the time the electrical motor is energized and the current achieves the current reference level. In addition, the analyzing means determines the state of the motor based on the information gathered in regards to the time elapsed and other factors:

Although Hammermann discusses how the information gained from the amount of time elapsed detecting means is used to control the motor, Hammermann invention fails to clearly show how the state of the motor can be analyzed using the information obtained about the rise time.

As discussed in paragraph 5 above, Ferrari teaches about a method that utilizes the rise time obtained by the detection means to analyze the state of the motor (Column 7 lines 23-28).

Thus, it would have been obvious for one having ordinary skill in the art at the time the invention was made to incorporate the method of detecting and analyzing the

rise time to determine the motor condition. The motivation being that controlling the initial current rise time would enable for a robust and efficient motor control with an improved step setting correction capacity through out the entire step range.

In regards to claims 13 and 14, Hammermann discloses an apparatus where the electric motor is a stepper motor and the amplifier is a chopper amplifier.

Regarding claim 15, Hammermann does not explicitly state that the method incorporates a timing means. However, official notice has been taken that a timing means is inherent as Hammermann's method includes measuring current verses time. Further, one can also always adopt Ferrari timing means into Hammermann method motivated by the need to monitor the rise time.

In regards to claim 18, Hammerman does not teach how the information gained through monitoring the rise time can be used. Nevertheless, Ferrari teaches how the rise time information can be used to determine if the motor has failed (i.e. stalled)(See Paragraph 5 of this office action above). Thus, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adopt Ferrari method into Hammerman invention in order to determine if the motor has failed.

**Allowable Subject Matter**

9. Claims 4, 7-8, 16-17, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Conclusion**

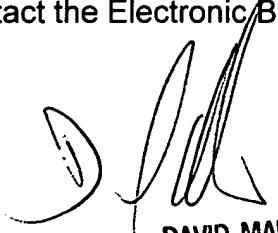
10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Please see the attached PTO-892 for all the art review in the process of the prosecution of the application.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elias B. Hiruy whose telephone number is 571-272-6105. The examiner can normally be reached on 7AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Martin can be reached on (571)272-2107. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EH



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